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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/529,409

08/22/2005

Douglas L. Gin

114-02

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09/26/2008

GREENLEE WINNER AND SULLIVAN P C

4875 PEARL EAST CIRCLE

SUITE 200

BOULDER, CO 80301

EXAMINER

FORTUNA, ANA M

ART UNIT

PAPER NUMBER

1797

MAIL DATE

DELIVERY MODE

09/26/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/529,409	Applicant(s) GIN ET AL.	
	Examiner Ana M. Fortuna	Art Unit 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 February 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/14/08</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-11, 24-26 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Bartlett et al (US 6,503,382) (hereinafter patent '382). Patent '382 discloses the membrane or porous film or organic LLC formed onto a substrate or support; the thickness the hexagonal arrangement and the cylindrical nanopores are disclosed in the patent (abstract, Fig. 1, column 1, last paragraph; column 2, lines 1-47; column 5, lines 14-16, 33-34; column 6, lines 25-58, claims 1, 2). The shape of the pores is shown in Fig. 1, and further discussed in the patent (column 11, lines 40-45). The first support or substrate is not clearly disclosed as porous, but formation of multiple layers on the first **porous film** is suggested.

As to claim 4, the membrane can be a single layer provided on the support or can include multiple layers (column 5, lines 34-44).

This patent does not expressly teaches the support a porous; however, suggests the use of "suitable substrate" (support) (column 5, lines 14-16), and the formation of multiple layers that can be the same or different in composition. The later teaching indicates that a second or more layer can be deposited on the first "porous film",

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rendering the first porous film a "support" for the subsequent layers (column 2, lines 41-42).

Patent '382 teaches that the first support can be separated or non-separated from the film, and that post-depositions on the film can be performed after the first film is separated from the substrate (if separated), which suggests using the first porous film as a substrate for the subsequent film(s) formation (column 6, lines 4-13).

It would have been obvious to one skilled in the art at the time this invention was made to alternatively select a porous support or substrate for casting the first membrane film, in particular when the support is not going to be removed from the final membrane, e.g. to improve membrane adhesion to the support. In addition selecting a conventional substrate, either porous or nonporous does not seem to be critical to the film formation based on the suggestion of convention a suitable support (column 5, lines 14-16).

As to claim 2, the limitation "less than about 0.1 microns" does not exclude nanometer pore size substrate, therefore, assuming the skilled in the art select to make the first porous film with a pore size of 1.3 nm (column 6, lines 25-35), if a second layer is disposed on top of that first layer or film, the support will meet this limitation.

As to claim 3, the thickness is discussed above (column 5, lines 33-37).

As to claim 5, the films can be made from polymers including PAN, and is not restricted for a particular layer, therefore, making a base layer of film of PAN would have been obvious to the skilled artisan at the time this invention was made (column 3, lines 53-63).

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The flux is not discussed in the patent above; since the pore sizes of the nanoporous film are within substantially the same ranges, the skilled artisan at the time this invention can predict that for the same selected film pore size and film thickness and operating pressure the same flux value should be expected.

As to claim 7, providing a complexing agent, e.g. treatment with ionic species (column 5, last paragraph bridging column 6).

Limitations of claim 8 are further disclosed in the patent (column 11, lines 6-12, claim 2).

Limitations of claims 9-11 are covered by the discussion of claims 2, 5, and 7 above.

As to claims 24-26, producing films with macroporous and nanoporous is disclosed (column 7, lines 25-35), and the formation of multi-films or multilayer structure is suggested in the patent, as discussed above. The use of the membrane in separation processes is further disclosed (column 9, lines 44-47).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 12-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gin et al (US 5,849,215) (hereinafter patent '215) in view of Bartlett et al (US 6,503,382). Patent '215 teaches the process of making a nanoporous film or membrane with tubular pores (reactive channels) (Figures; column 1, last paragraph through page 2, line 30; column 3, lines 30-39; column 4, lines 6-59; column 5, line 26-column 6, line

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23; and column 8, line 60-column 9, line 15). The evaporation of solvents from the solvent forming solution is not disclosed. The polymerization and nanoporous formation is performed by ultraviolet light application in presence of a crosslinker. Any remaining solvent in the from the reaction can be inherently evaporated or wash from the membrane by conventional methods. The patent '215 also teaches formation of the nanostructure into layer (films or fibers (column 19, lines 47-61); the pores are within a range of 3-6 nanometers structures (column 10, lines 1-5). Patent '215 does not teach forming the films or layers onto a porous support.

Patent '382, discussed above teaches providing LLC layer(s) or films on a support that can be part of the final membrane (discussed in the paragraph above). The later patent also teaches selecting a "suitable support material", and forming a film on a previously formed porous nanoporous film. The skilled in this art at the time the invention was made would have been motivated to provide a support for the structure of patent'215, and further to select a porous support that is porous, e.g. to facilitate attachment to the film to the support, and increase membrane strength. Patent '215 further teaches the structure of claim 16 (inverted hexagonal phase0 (see figure 3).

As to claims 13-21, 22-24, the support material and pore size is not disclosed; however, microporous polysulfone is a conventional membrane support material.

Controlling thickness by adjusting the amount of monomers in the composition would have been obvious to one skilled in the art at the time this invention was made; the thickness ranges suitable for nonporous membranes are disclosed in patent'382, discussed in the paragraph above. The final product in patent' 215 further fills the pores

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of the nanostructure to provided a composite (with condensed channels); the intermedia product contains the nanopores required in the product of the current methods.

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Claim Rejections - 35 USC § 112

5. Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 6 is incomplete regarding to whether the flux refers to a gas flux or a liquid flux or water flux.

Information Disclosure Statement

6. The information disclosure statement (IDS) submitted on 2/14/08 was considered by the Examiner.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Reference 7,090,788 teaches the LLC nonporous layer on a porous support, but it is not prior art for the current application. Kawata reference teaches the LLC layer, but not porous support.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ana M. Fortuna whose telephone number is (571) 272-1141. The examiner can normally be reached on 9:30-6:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David R. Sample can be reached on (571) 272-1376. The fax phone

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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ana M Fortuna
Primary Examiner
Art Unit 1797

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